A current or a projectile or a Foucault pendulum is equally deflected whatever be the direction of motion. The deflection is always to the right in the northern hemisphere and to the left in the southern. An eastward going current in both hemispheres is deflected toward the equator.

THE NATURE OF VOWELS.

MY next criticism is of a statement contained in article taken from the *London Times*. This, of course, is not an authoritative source, but since it reappears in SCIENCE it ought not to go unchallenged.

Speaking of the use of the phonograph in analyzing complex sounds, the writer says: "Hermann has obtained the curves corresponding to the tones of the vowels and has shown that vowels are true musical tones, *each having its own pitch*, and not, as Helmholtz supposes, the pitch of a harmonic tone corresponding to the shape of the oral cavity."

Now it is true that the vowels are true musical tones, but it is not true that each has its own pitch. The vowel sounds are a phenomenon, not of pitch, but of quality or *timbre*. All the vowels can easily be made successively without at all altering the pitch of the voice. Pitch is made in the larynx; the timbre is made in the mouth cavity. The one depends on the *number*, the other on the *form* of the waves. Doubtless the phonograph will prove a very useful instrument in analyzing vowel sounds; doubtless the investigations of Hermann and others mentioned are important; doubtless Hemholtz's theory will be corrected and improved, but that the vowel sounds are a phenomenon of timbre and not of pitch is too plain to be doubted. The writer has not fully understood or else not clearly stated either Helmholtz's theory or the bearing on it of these recent investigations.

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[It would add much to the interest and value of this journal, and thus contribute to the advancement of science, if we should all follow the recommendations made by Professor Le Conte in his opening paragraph. J. McK. C.]

SCIENTIFIC LITERATURE.

Analytical Chemistry. By M. MENSCHUTKIN; translated by JAMES LOCKE. Macmillan & Co. Pp. 512. $4.00 net.

Among the numberless text-books on analytical chemistry, the well-known work of Menschutkin appears to occupy an unique position in this respect, that the author emphasizes the didactic rather than the practical value of this branch of chemistry. Skill and accuracy in Qualitative and Quantitative Analysis have such a distinct commercial value that we cannot properly find fault with the share of attention they receive in the chemical curriculum of most institutions; the supply of competent analysts and essayers cannot be too great. But, in this age of specialization, it is allowable to ask whether the elementary education of the scientific investigator ought to be identical with that of the analyst.

Largely through the influence of one great writer, analysis has been 'codified,' and 'Fresenius' has become for the chemical student what 'Blackstone' is to the beginner in law. The ease with which we can acquire the principles and methods of analysis, by the careful study and practice of such a code, is wonderful; but we do not, in the meantime, advance appreciably beyond that point, in *chemical knowledge*, where the Elementary Inorganic Chemistry had left us. Menschutkin's book is intended, according to its Introduction, for students who propose advancing into Organic, Physical and Theoretical Chemistry, and he strives to cultivate the same habits of thought, in their study of Qualitative Analysis, as will be essential in the advanced branches.

This is an admirable standpoint, and one which should ensure the book a reading from all earnest students.

Unfortunately, there are a number of defects that impair its usefulness as a text-book. In the effort to enhance its didactic value by adhering to the inductive method, systematic treatment has been neglected. Descriptions of apparatus, operations and manipulations are introduced in such sequence as may afford the student progressive practice, indeed, but in no strictly logical order. As there is a very scanty index, it is impossible to refer to particular operations, for instance, without reading the book through. Unnecessary verbiage, frequent repetitions of facts already stated, facts connected very remotely with the subject in hand, tend to break the continuity and unnecessarily to increase the bulk of the volume.

Several times the wrong equations are given intentionally, 'because the right ones would be too complicated.' This seems to be rather unscientific treatment.

As for the actual subject-matter, both the special reaction and the systematic methods of Qualitative Analysis appear to be admirably chosen. Is it not time, however, that schemes for complete analysis should consider the possible presence of elements so frequently met with in natural and artificial products as are titanium, lithium, uranium and tungsten? It is also peculiar that, while the rarer elements are dismissed in the Qualitative Analysis, with a few paragraphs describing their most characteristic special reactions, these same paragraphs contain detailed instructions for their purification and quantitative determination!

The quantitative analysis of the common elements is treated in the last two hundred pages in an admirable manner, the separations especially receiving adequate consideration. But it seems queer to read of certain methods as recently discovered, which have been in use ten or fifteen years; while the author appears to be quite unfamiliar, for instance, with the Gooch Crucible, whose use has removed so many obstacles from the analyst's path.

The translation is not done very skillfully—it is unidiomatic, and in many passages two or three readings are required before the author's sense can be accurately ascertained.

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A Treatise on Civil Engineering. By W. M. Patton. New York, John Wiley & Sons. 1895. Octavo, pp. xviii, 1654. Price, $7.50.

Fifty years ago it was easy to compress the science and art of civil engineering into a single volume; to-day it is an impossibility. Civil, as distinguished from military, engineering is scarcely a century old, but its growth has been so vigorous, and the branches of its activity are so numerous, that the term is becoming somewhat vague. Telford's definition—the art that utilizes the materials and forces of nature for the benefit of man—was a good one in 1818, but it now can only be applied to the whole field of construction which is now subdivided into civil, mechanical, mining and electrical engineering.

The best definition that can now be given is perhaps the following: Civil engineering is the science and art of economic construction undertaken for the purpose of facilitating the transportation of men and matter. It thus embraces roads, railroads and canals, upon which men and freight are transported, together with river and harbor improvements; irrigation, water and sewerage systems for the transportation of water and sewage; and all the necessary foundations, bridges and structures for these objects. It includes all the surveys, estimates and mechanical principles required to build and maintain such construction in the most